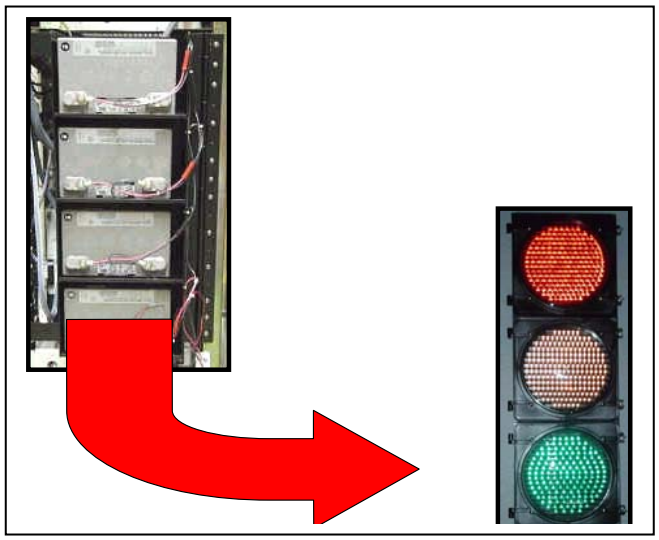
CALIFORNIA
ENERGY
COMMISSION

SENATE BILL 84 XX
BATTERY BACKUP PROGRAM FOR LIGHT EMITTING DIODE (LED) TRAFFIC SIGNALS



COMMISSION REPORT

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Arnold Schwarzenegger, *Governor*

CALIFORNIA ENERGY COMMISSION

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Disclaimer

This report was prepared by the California Energy Commission's Energy Efficiency Committee to be consistent with the objectives of Senate Bill 84 XX (Burton), Chapter 6, Statutes of 2001-02. The report was adopted by the Energy Commission on May 5, 2004. The views and recommendations contained in this document are not the official policy of the Energy Commission until the report is formally adopted.

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EXECUTIVE SUMMARY

Introduction

The Battery Backup Program for Light Emitting Diode (LED) traffic signals was initiated as a result of Senate Bill 84 XX (Burton), Chapter 6, Statutes of 2001-02. This bill provided the State Energy Resources Conservation and Development Commission (Energy Commission) with $10 million from the California Technology, Trade and Commerce Agency's Renewable Energy Loan Loss Reserve Fund (RELLRF). The bill required the Energy Commission to develop and implement a matching grant program to fund battery backup systems for traffic control signals containing LEDs. The eligibility for the funds was limited to cities, counties and San Francisco. To ensure the program met the needs of local governments, the Energy Commission formed an Advisory Committee consisting of traffic signal control experts from government and the private sector. Their program suggestions and technical guidance resulted in the production of the program application and funding criteria.

The Energy Commission had two grant solicitations in 2002. These solicitations resulted in 187 grant awards totaling $9,514,027 and the installation of 4,724 battery backup systems. Since each system operates all traffic lights at an intersection, 4,724 intersections would have backup power in the event of an electrical outage. As required by Senate Bill 84 XX, Section 3 (b), this report summarizes the expenditures, grant awards and program activities. The report also provides conclusions about the future of battery backup systems for traffic signals in California.

Legislative Requirements

Senate Bill 84 XX was signed into law on September 28, 2001. The purpose was to provide funding to local governments for the purchase and installation of backup battery systems for their traffic control signals. These backup systems would operate either the red traffic signal as a flasher, or all the signals during a power outage. This bill was considered an urgency statute. Section 4 of the bill states:

> "Due to the shortage of electric generation capacity to meet the needs of the people of the state in order to limit the impact of that shortage on the public heath, safety, and welfare due to the non-operation of traffic control signal lights during anticipated rotating blackouts, it is necessary that this act take effect immediately."

The bill authorized the Energy Commission to:

- Develop and implement a program to provide battery backup power for traffic control signals operated by local governments.

- Determine the criteria used to identify and rank priority intersections for the installation of battery backup systems with consideration given to traffic volume, number of accidents and the presence of children.
- Give priority consideration to local governments that did not receive a grant from the State for the installation of LED traffic control modules under AB 970 (Ducheny), Chapter 329, Statutes of 2000.
- Develop the technical criteria for the battery backup systems.
- Fund battery backup systems only on intersections with LED traffic signals. The bill allowed funding for battery backup systems in local governments that had converted only the red traffic signal lights to LEDs and to those that had converted all or a portion of the remaining signals to LEDs. For those with only the red LED traffic signal, the battery backup power would operate the red signals in the flash mode during an electrical outage. For those that converted all or a portion of the remaining signals to LEDs, the battery backup power would fully operate all the traffic control signals (red, green, amber, pedestrian signals) during an electrical outage.
- Limit grant eligibility to battery backup systems that have not yet been installed or to those installed between January 1 and September 28, 2001.
- Set the maximum grant amount at 70 percent of the battery backup system cost for units that have not yet been installed. At least $8 million was available for these installations.
- Set the maximum grant amount at 30 percent of the battery backup system cost for units installed between January 1 and September 28, 2001. Up to $1.5 million was made available for these installations.
- Report to the Governor and Legislature, on or before June 1, 2004, on the expenditures, grant awards and program activities associated with the battery backup system program.

Summary of Results

SB 84 XX increased the demand for battery backup systems. Many local governments would not have installed as many systems without the funding support from the bill.

With technical advice and guidance from the Advisory Committee, the Energy Commission developed a program application and evaluation criteria for identifying high priority intersections. The resulting program addressed both the concerns of local governments and the bill's requirements. Based on comments from participants, the program was well received by local governments, battery backup system manufacturers and contractors.

The Energy Commission conducted two competitive solicitations in 2002. In each solicitation, data on intersections were evaluated to determine whether it met the criteria in Appendix A. Points were assigned to each criteria and those intersections that achieved a minimum number of points were considered priority intersections. As a result of both solicitations, grants were awarded to 173 cities and 13 counties and San

Francisco, which is both a city and county for the installation of 4,724 battery backup systems. A total of $9,514,027 was awarded. However, due to budget difficulties, nine local governments declined their grants and several others requested less grant funds due to decreases in the battery backup system cost. These events result in $1,279,875 in unencumbered funds as of May 1, 2004. The following table summarizes the program awards.

Table 1: Summary of Program Awards and System Installations as of May 1, 2004

Total Grant Amount Awarded as of January 2003	$9,514,027
Estimated Grant Funds Spent*	$8,790,935
Estimated Unencumbered Funds	$1,279,875
Number of Local Governments Receiving Grants**	178
Installed Battery Backup Systems***	4,470

*Includes completed projects and estimated cost for those completed by May 1, 2004.
**Excluded cancelled grants.
***Includes completed projects and estimated installations completed by May 1, 2004.

Passage of Assembly Bill 1757 (Oropeza), Chapter 229, Statutes of 2003, abolished the Technology, Trade and Commerce Agency and the RELLRF. As a result, the final date for awarding grants was changed from September 2005 to December 31, 2003. Any unencumbered funds remaining in the program after December 31, 2003, will return to the General Fund. As of May 1, 2004, the amount of unencumbered funds is $1,279,875. This amount could increase once final invoices are submitted by the grant recipients.

Though grants can no longer be awarded, there is continued demand and interest for installing battery backup systems. Prior to the program ending, at least 16 local governments had expressed interest in applying; ten of them had already submitted preliminary applications. Several local governments indicate that they will include battery backup systems whenever new signalized intersections are constructed.

The battery backup program has resulted in the following benefits to local governments and California:

- Increased energy efficiency of traffic signal lights. To accommodate battery backup systems that would operate **all** traffic signals during a power outage, many local governments converted all their traffic signals to LEDs. LED traffic signal modules use up to 90 percent less energy than conventional traffic signals. By converting all traffic signals to LEDs, local governments reduce annual operating and maintenance costs, save money on their electric bills and benefit the state by lowering electrical loads, especially during peak periods.

- Increased public safety and reduced traffic congestion by allowing traffic lights to function even during a power failure. A typical traffic signal intersection experiences eight to ten local power outages annually. With battery backup

power, some or all the traffic control signals can continue to operate. This seamless switchover to battery power increases public safety and eliminates the need to dispatch police or other service personnel to direct traffic. If all traffic signals were converted to LEDs, the battery backup system would allow full operation of the traffic signals during a power outage, thus alleviating traffic congestion.

- Reduced the cost of battery backup units. The large number of battery backup units purchased through this program caused manufacturers to improve the technology and reduce the unit cost. As a result, about 23 percent of the grantees did not use all their awarded grant funds.

BACKGROUND

During the energy shortages in 2000 and 2001, the state and the major utilities implemented several programs to reduce the electrical load during peak periods. One of these programs focused on converting incandescent traffic signals to those using LEDs. As LED traffic signals use only one-tenth of the electricity of traditional incandescent traffic signals, the state and the major utilities provided incentives to encourage public agencies to convert their signals. Funding for the state's incentive program came from AB 970 (Ducheny), Chapter 329, Statutes of 2000. About $11.7 million in grant funds were provided to 57 public agencies to fund the conversion of 170,396 traffic signals at 11,466 intersections. The resulting conversions saved participating public agencies about $4.5 million in electricity costs annually and reduced California's peak demand by 5.9 megawatts.

While LED traffic signals are far more efficient than traditional incandescent traffic signals, they still require electricity to operate. Due to power outages in 2001, many local governments had non-functioning traffic lights at intersections. This resulted in accidents and traffic congestion. SB 84 XX addressed this issue by providing funding to local governments to install battery backup systems for their traffic control signals. These systems would be installed in the traffic control cabinet located at the intersection (Figure 1), or in their own cabinet adjacent to the controller (Figure 2), at an additional cost of $700 or more. The cabinet contains an electronic traffic controller which sequences the operation of each signal light. When a power outage occurs, the battery backup system works in conjunction with the controller to either operate the red signal in the flash mode or to operate all the signals in the fully functional mode. The mode depends on whether some or all the traffic controls signals are converted to LEDs. The viability of using battery backup systems was made possible only if the intersections already contained LED traffic signals.

FIGURE 1: Battery Backup System in controller cabinet.

FIGURE 2: Battery Backup System in its own cabinet.

PROGRAM ACTIVITIES

Advisory Committee

The bill required the Energy Commission to consult with local governments to determine the criteria for identifying priority intersections for the battery backup systems. As a result, the Energy Commission formed an Advisory Committee consisting of entities with experience in installing battery backup systems, knowledge of system specifications and requirements, and knowledge of the factors for determining priority intersections. Committee members included representatives from various local governments, utilities and battery backup system contractors (see acknowledgements).

The Committee convened for the first time in January 2001, to discuss program structure, criteria for determining priority intersections, technical criteria for the battery backup systems, cost and maintenance issues, and funding limits. The Committee identified the following as the main criteria for determining priority intersections:

1. High Traffic Volume—Intersections with more than 2,500 vehicles passing through them in a 24 hour period.
2. High Number of Injury Accidents—Intersections with more than one injury accident per million vehicles per intersection per year.
3. Children—Intersections within a one-mile radius of a K-12 school.
4. High Speed of Approach Traffic—Approach traffic with a speed of 45 miles per hour or greater for each cross street.
5. Pre-emption—Intersections equipped with audible sound, accessible signals or pre-emption controls.

The Advisory Committee agreed that the battery backup systems meet or exceed the California Department of Transportation Specifications, October 2001.

Grant Solicitations and Awards

Based on the input from the Advisory Committee, Energy Commission staff developed the grant application and evaluation criteria for priority intersections. The application identified how a priority intersection would be determined, the incentive amounts and the application process. Appendix A contains the evaluation criteria used for determining high priority intersections.

The Energy Commission publicized the program through local government conferences and tradeshows, direct mailings to local governments and battery backup system manufacturers and installers, and press releases (see Appendix B). Both the League of California Cities and the California State Supervisors Association sent e-mails to members notifying them of the program.

A solicitation was first issued on April 23, 2002 with a closing date of June 21, 2002. The Energy Commission received 133 applications. Staff reviewed the applications and determined that 125 met the program requirements. These applicants were subsequently awarded grants totaling $7,240,292 (see Appendix C, First Round). Of the 125 awards, 36 were for battery backup systems already installed. These installations were allowed by the legislation if they occurred between January 1 and September 28, 2001. The remaining 89 were for installations occurring after the grant award.

A second solicitation was offered on October 4, 2002, with a closing date of December 9, 2002. The Energy Commission received 62 applications. Staff reviewed the applications and determined that all 62 applicants met the program requirements. These applicants were subsequently awarded grants totaling $2,893,209 (see Appendix C, Second Round). Of the 62 awards, eight were for battery backup systems already installed and the remaining 54 were for new installations.

As a result of both solicitations, 187 local governments received grants ranging from $870 to $327,600, with an average grant size of $50,877. The average number of battery backup systems installed is 25.

Grant Fund Disbursement

Local governments receive grant funds when the battery backup systems have been installed. The funds are disbursed based on actual incurred expenses identified on invoices, up to the maximum grant award. The grant provides up to 70 percent of the battery backup system cost for new installations and 30 percent for existing installations. Local governments are required to pay the remaining equipment cost plus the labor to install the units.

Program Status

As of May 1, 2004, 147 local governments have completed their projects and have invoiced for all their funds. There are 20 participants that have installed their battery backup systems but have not yet invoiced the Energy Commission. There are 11 in the process of completing their projects and it is anticipated that most will be complete by May 1, 2004. The final liquidation date for the funds is December 2005. Nine participants cancelled their grants because they lacked the matching funds. The following table summarizes the status of the program funds as of May 1, 2004.

Table 2: Status of Current Program Funds (May 1, 2004)

Project Categories	Number of Grantees	Amount
Completed/Invoiced	147	$6,564,192
Completed/Not Invoiced	20	$1,485,500
Projects in Progress	11	$670,433
Unencumbered Funds*	9	$1,279,875*
Total	187	$10,000,000

*Includes cancelled grants ($542,069) and grantees not billing the entire awarded amount ($737,806).
Source: California Energy Commission

Once all grantees have completed their projects, approximately $1.4 million will be unencumbered. This amount is due to grant cancellations and grant recipients not billing for the entire grant and could increase once the final invoices are received.

After operating two competitive solicitations in 2002, the Energy Commission planned to operate a continuous solicitation starting in 2003 to use all the unencumbered funds. There were ten local governments that had preliminarily submitted intersection information and six others that were waiting to apply. However, Assembly Bill 1757 (Oropeza), Chapter 229, Statutes of 2003, abolished the Technology, Trade and Commerce Agency and the RELLRF. As a result, the Energy Commission was unable to issue another solicitation to use unencumbered funds.

Operating a continuous solicitation would have resulted in encumbering all grant funds. The start and stop nature of competitive solicitations prevented the acceptance of applications after the due date, even if funds were available. A continuous solicitation, however, would have allowed applications to be accepted until all funds were expended and would have provided battery backup systems to more local governments.

CONCLUSIONS

Benefits of Battery Backup Systems

The first battery backup systems installed through this program have now been in place for nearly three years. Grant participants have been very satisfied with their installations. They have used their battery backup systems at least eight to ten times per year due to local power outages and these systems have reduced traffic congestion, injury accidents and controller maintenance. Many acknowledge that due to the high cost of the battery backup systems, many could not have installed so many without grant support (Appendix D).

As a result of this program, manufacturers improved the technology and reduced the battery backup system cost during the period of the program. For instance, at the start of the program, the average cost of a battery backup unit was $3,500 to $6,000. Today, the average cost is $1,900 to $3,500.

Future of Battery Backup Systems

Conversations with program participants, traffic engineers, and battery backup system manufacturers indicate that the demand for battery backup systems will continue, albeit at a slower rate once the grants cease. The continuing interest stems from a number of factors—lower cost systems, the increasing capabilities of battery backup systems, and the increased use of LED traffic signal modules.

Between April 2002 and April 2004, battery backup system costs dropped an average of 22 percent. Manufacturers estimate that the cost will continue to drop due to technological improvements and elimination of the need to provide separate cabinets for the systems. The elimination of a separate cabinet saves about $700 per installation. The ability to incorporate the battery backup systems into the traffic signal control cabinets was made possible due to the use of gel cell batteries instead of lead acid batteries. Gel cells do not leak, thus eliminating the possibility of fumes and corrosive acids that could damage the controllers.

Though local governments are purchasing battery backup systems for their capability to provide backup power to traffic lights, many are also focusing on other system features such as electrical surge protection and maintenance of the controller memory during power outages. Power surges are spikes in voltages that originate from the electric utility. Though the spikes only last millionths of a second, they can be harmful to electronic controllers that sequence traffic lights. Repeated power surges can damage the controllers and cause traffic lights to fail. Local governments report that traffic light outages caused by electrical surges have been eliminated and controller maintenance and replacement have been reduced.

Another important feature is the battery backup system's ability to maintain the memory of the traffic signal controller. The controller is responsible for sequencing the on and off times of the various signals. With a battery backup system, the controller's memory can be maintained and return to normal operation once the outage has ended. This feature has eliminated the time spent to reprogram controllers after a power outage.

In February 2002, the Energy Commission adopted new energy efficiency standards for traffic signal modules and traffic signal lamps (California Code of Regulations, Title 20, section 1605.3(m)). The standards require that any traffic signal module or traffic signal lamp which is manufactured on or after March 1, 2003, and is sold or offered for sale in California, must consume no more than specified amounts of power. The only technology currently capable of meeting the requirements are LEDs.

Due to this state standard, new intersections will be equipped with LED traffic signal modules. For new intersections, the cost of adding a battery backup system is small compared to the cost of installing traffic signals at an intersection. Installing traffic signals at an intersection costs about $150,000 and could exceed $200,000 for major intersections.[1] A battery backup system costs about $3,500.[2] Many local governments believe that this added cost is warranted in order to keep traffic moving through intersections, ensure public safety and eliminate the need for city staff to direct traffic at dark intersections. According to Dennis Barnes, City Traffic Engineer for the City of Santee, "The City of Santee has established a new policy of implementing a battery backup system in all future traffic signal installations."

The new state standard will increase conversions to LED traffic signals at existing intersections. Once the traffic signal modules are converted to LEDs, installing a battery backup system will be possible due to significantly less power used by LEDs versus incandescent signals. The cities of Santa Cruz and Campbell converted their signals at major intersections to those using all LEDs, which enabled the installation of battery backup systems. Both cities have indicated that the battery backup systems have significantly increased safety for drivers and alleviated the need to have police direct traffic at intersections during a power failure.

Lessons Learned

The Battery Backup Program was different than other Energy Commission programs because battery backups do not result in any energy savings or load reduction to the state. However, this section discusses the lessons learned from our participation in this program.

- Advisory Committee—Since the Energy Commission staff are not traffic experts, the Committee verified that the program made sense. The Advisory Committee's suggestions and feedback were vital to the success of the program.

[1] The Mercury News, January 26, 2004, "No Mistaking: Traffic Signals Really Are Costly."
[2] California Energy Commission, Battery Backup Program database, March 24, 2004

- Program Marketing—The Energy Commission saved time and money by working with the League of California Cities and the California State Association of Counties. Rather than staff sending a mass mailing to all their members, staff relied on these local government associations to send out e-mails to their members. This process expedited the program notification and strengthened the Energy Commission's relationship with these associations.
- Battery Backup System Manufacturers and Contractors—The manufacturers and installers of battery backup systems contributed to the success of the program. Since the start of the program, manufacturers have made many improvements to the battery backup systems while lowering the system cost. This resulted in battery backup system costs dropping an average of 22 percent, thus saving money for local governments and the state. Many local governments hire contractors to maintain their traffic signals. These contractors played a major role in informing local governments about the program and accounted for an estimated 25 percent of the grant participants.
- Grant Funding—Though the grant provided between 30 and 70 percent of the battery backup system cost, many local governments still could not come up with the matching funds to participate in the program. The grant percent amount offered by this program was higher than past Energy Commission efficiency programs.
- Competitive Solicitation Process—Unlike the Energy Commission's other local government programs, the Battery Backup Program had competitive solicitations, rather than a continuous solicitation. Though a competitive solicitation ensured that only the highest priority intersections would receive funding, the process was time consuming, inflexible and prevented the Energy Commission from encumbering all funds. The start and stop nature of competitive solicitations prevented the acceptance of applications after the due date, even if funds were available. A continuous solicitation would have allowed applications to be accepted until the funds were all expended.
- Energy Savings—The Battery Backup Program encouraged more local governments to install energy saving LED traffic signal modules. In fact, the battery backup systems desired most by program participants were the ones that allowed all traffic signals to fully operate, rather than just flash red, during a power outage. This resulted in more conversions of the green and yellow traffic signal lights to LEDs and unexpected energy savings from the program.
- Demand for Battery Backup Systems—There is continuing demand for battery backup systems. Many local governments have seen the benefits and are starting to specify them for all future intersections with traffic signals. Due to SB 84 XX, improvements to the battery backup technology were accelerated and more companies are manufacturing battery backup systems. The competitiveness among firms will likely result in more technological improvements and possibly lower cost systems in the future.

As a result, the safety benefits of battery backups combined with the energy savings of LED signals should make these installations the standard choice for new and existing traffic signals. Appendix D contains comments from local governments about their future battery backup system installations.

APPENDIX A: GRANT APPLICATION - EVALUATION CRITERIA

Evaluation Criteria and Points

Intersection Criterion	Key Element	How evaluated?	Maximum Points
Traffic volume	• Maximum traffic volume over a 24 hour period • Only intersections will be used for traffic volume calculations	The number of vehicles traveling through each intersection over a 24 hour period would be evaluated as follows: • Less than 2,500 = 0 • 2,501 to 10,000 = 2 points • 10,001 to 20,000 = 3 points • 20,001 to 30,000 = 4 points • Greater than 30,001 vehicles = 5 points	5 points
Injury Accidents	• Intersections with more than one injury accident per million vehicles per intersection per year	• Intersections meeting this criterion = 1 point • Intersection not meeting this criterion = 0 points	1 point
Children	• Intersections within a one mile radius of a K-12 school	• Intersections meeting this criterion = 1 point • Intersection not meeting this criterion = 0 points	1 point
Speed of Approach Traffic	• Approach traffic speed of 45 miles per hour or greater for **each** cross street	• Intersections meeting this criterion = 1 point • Intersection not meeting this criterion = 0 points	1 point
Pre-emption	• Intersections equipped with audible sound, accessible signals or pre-emption controls	• Intersections meeting this requirement = 1 point • Intersection not meeting this criterion = 0 points	1 point
MAXIMUM POINTS AVAILABLE			**9 POINTS**

- Priority one intersections are those with 7 or more points
- Priority two intersections are those scoring between 6 and 7 points
- Priority three intersections are those scoring between 5 and 6 points

Funding priority: Priority one intersections would be funded first, followed by priority two and three.

APPENDIX B: PRESS RELEASES

For immediate release: May 20, 2002
Media Contact: Rob Schlichting - 916-654-4989

Battery Backups at Critical Traffic Signals Prevent Accidents During Power Outages

Sacramento - Good news for California motorists: blacked out traffic signals at major intersections could soon become a thing of the past.

The California Energy Commission is accepting applications from cities and counties seeking to keep their traffic signals operating if the electricity goes out. The new public safety program will provide battery backup protection for high priority intersections equipped with LED (light emitting diode) lamps.

"When electric power fails and signal lights go out at a busy corner, traffic slows to a crawl," explained Energy Commissioner Robert Pernell. "Automobile accidents increase, and pedestrians find that weaving their way through the unregulated maze can be a dangerous, challenging prospect. But now local governments can protect critical intersections from power interruptions that can threaten motorists and pedestrians alike."

Legislation passed last September sets aside $8.5 million in matching grants to help pay for new battery backup systems. An additional $1.5 million was appropriated to pay for systems that were installed between January 1 and September 28, 2001, in response to the State's electricity crisis.

Battery backup systems are the result of new technology. Newly installed traffic signals utilize more efficient, LED lamps that cut the amount of electricity used by each light from as much as 150 watts to between 10 to 25 watts. Since the electricity needed to operate LED lights can be 85 percent less than that needed by incandescent lamps, it's now technically possible to provide backup power for critical intersections.

Earlier, the State allocated $11.8 million to help convert California intersections to more efficient LED lights. These grants, along with low-interest loans provided by the Energy Commission, have helped local governments convert over a third of the State's intersections to LED lights. The new signals now save over $8 million a year in energy costs and reduce energy use by over 10 megawatts Ñ enough electricity to power 10,000 typical California homes.

"In addition to saving energy, LED traffic signals by themselves are brighter and easier to see in foggy conditions," said Pernell. "Thanks to their low energy use, we can now protect critical intersections that use LEDs from dangerous power outages that can cause accidents."

Battery systems cost between $1,800 and $3,000, depending on the number of lights at the intersection. Each system provides enough electricity to operate the traffic signals in the normal, fully functioning mode or as red flashing lights for two hours. After that time, the signals will flash red for another two hours, alerting motorists that the intersection is operating as a four-way stop.

Since local governments best understand which of their intersections are most vulnerable, the Energy Commission established an advisory committee of cities, counties, local utilities and CalTrans representatives. The committee advised the Commission on ways to identify high priority intersections, using criteria such as traffic volume, the number of accidents and the presence of children at the intersection. Under the program, cities or counties can receive up to 70 percent of the equipment costs to install a backup system.

Applications for these matching grants are being accepted by the Commission until a cutoff date of June 21, 2002. Grants for the battery backup systems will be awarded starting in August 2002. Recipients will then have one year to complete the installation.

For immediate release: October 4, 2002
Media Contact: Rob Schlichting - (916) 654-4989

Battery Backups Prevent Accidents at Critical Traffic Signals

Additional Applications Being Taken for More Intersections

Thanks to new energy-efficiency technology, 112 different California cities, towns and counties will keep their traffic signals safely operating even if the electricity goes out, and other local governments will join them soon.

Already more than a third of California's intersections have been converted to new LED signal lights utilizing more efficient, LED (light emitting diode) lamps. The new lamps cut the amount of electricity used by each light from as much as 150 watts to between 10 to 25 watts. Because LEDs use so much less electricity, it is now technically possible to provide battery backup power to operate them at critical intersections. The result will be fewer accidents that can threaten motorists and pedestrians alike.

Nearly $7.3 million in matching grants to local governments has already been approved by the California Energy Commission, and applications are due December 2, 2002 for an additional $2.7 million for additional installations of battery backup systems. The funds are made available through Senate Bill 84XX, public safety legislation that provides battery backup protection for high priority intersections.

The Energy Commission recently approved up to $6.1 million in partial funding that will enable 89 cities, towns and counties to install new backup systems. The grants pay up to 70 percent of the cost of new battery systems installed after the award given by the Energy Commission.

Thirteen of those same cities, towns or counties are among the 36 local governments that will receive up to $1.2 million for backup systems that were previously installed between January 1, 2001 and September 28, 2001, the date that Governor Davis signed the legislation. These retroactive grants will pay up to 30 percent of the costs involved in putting the systems in place.

Additional funds are available for both new and retroactive grants. Information and application forms are available on the Energy Commission's website at

www.energy.ca.gov/peakload/traffic_backup.html

Battery backup systems cost between $1,800 and $3,000 per system, depending on the type and number of LED traffic signals at the intersection. Each system provides enough electricity to operate the traffic signals in the normal, fully functioning mode or as red flashing lights for two hours. After that time, the signals will flash red for another two hours, alerting motorists that the intersection is operating as a four-way stop.

The Energy Commission worked with local governments to identify vulnerable, high priority intersections, using criteria such as traffic volume, the number of accidents and the presence of children at the intersection.

APPENDIX C: LIST OF ALL PARTICIPANTS

(as of May 1, 2004)

Battery Backup System First Round Solicitation Applicants

City	County	Grant Amount	Fully Functional **	Flash Only***
City of Dublin	Alameda	$22,400	8	
*City of Fremont	Alameda	$17,864	22	
*City of Hayward	Alameda	$7,830	15	
City of Hayward	Alameda	$40,320	25	
City of Livermore	Alameda	$58,240	26	
City of Pleasanton	Alameda	$70,525	20	
City of Antioch	Contra Costa	$19,944	9	
City of Concord	Contra Costa	$26,950		14
City of Pleasant Hill	Contra Costa	$19,600		7
County of Contra Costa	Contra Costa	$44,800	16	
Town of Moraga	Contra Costa	$3,150		4
*Town of Moraga	Contra Costa	$9,800		3
County of El Dorado	El Dorado	$40,600	16	
*County of El Dorado	El Dorado	$870	1	
City of Clovis	Fresno	$7,350	Declined Grant	
*County of Kern	Kern	$38,456		41
City of Artesia	Los Angeles	$37,660	14	
City of Baldwin Park	Los Angeles	$36,540	18	
City of Bell	Los Angeles	$14,210	7	
City of Burbank	Los Angeles	$53,200	20	
City of Claremont	Los Angeles	$14,035	7	
*City of Claremont	Los Angeles	$14,400	12	
City of Commerce	Los Angeles	$103,320	41	
City of Culver City	Los Angeles	$42,000	15	
City of Inglewood	Los Angeles	$89,600	32	
City of La Mirada	Los Angeles	$31,850		13
*City of Lakewood	Los Angeles	$17,052		46
City of Lancaster	Los Angeles	$73,500		30
City of Lomita	Los Angeles	$14,234	7	
City of Long Beach	Los Angeles	$57,389	27	
City of Lynwood	Los Angeles	$57,050	2	21
City of Manhattan Beach	Los Angeles	$55,674	27	
City of Montebello	Los Angeles	$142,380	63	
City of Monterey Park	Los Angeles	$105,560	26	4

City	County	Grant Amount	Fully Functional **	Flash Only***
City of Palmdale	Los Angeles	$95,550		39
*City of Paramount	Los Angeles	$42,000		37
City of Pico Rivera	Los Angeles	$29,120	13	
City of Redondo Beach	Los Angeles	$101,500	51	
City of Santa Fe Springs	Los Angeles	$91,840	41	
City of South Gate	Los Angeles	$72,800	26	
City of Torrance	Los Angeles	$145,600		64
City of West Covina	Los Angeles	$119,104	64	
*City of Westlake Village	Los Angeles	$14,378	12	
Los Angeles County Department of Public Works	Los Angeles	$170,800	61	
City of Corte Madera	Marin	$8,120	5	
City of Larkspur	Marin	$9,643	7	
City of Mill Valley	Marin	$9,643	6	
City of Novato	Marin	$46,284	24	
City of San Rafael	Marin	$30,240	12	
City of Sausalito	Marin	$18,270	9	
County of Marin	Marin	$5,600	2	
*County of Marin	Marin	$9,600	11	
City of Atwater	Merced	$9,800		4
City of Monterey	Monterey	$20,006	8	
City of Salinas	Monterey	$14,700		6
*Monterey County Department of Public Works	Monterey	$11,550		11
City of Buena Park	Orange	$61,180	13	
City of Costa Mesa	Orange	$113,664	44	
City of Cypress	Orange	$14,700		6
City of Garden Grove	Orange	$29,925	Declined Grant	
*City of Huntington Beach	Orange	$6,764		10
City of Huntington Beach	Orange	$291,200	104	
*City of Laguna Niguel	Orange	$59,850		74
City of Mission Viejo	Orange	$142,240	4	47
*City of Mission Viejo	Orange	$29,856	20	6
City of Orange	Orange	$129,640	48	
*City of Westminster	Orange	$41,041		80
City of Yorba Linda	Orange	$109,200		39
City of Roseville	Placer	$327,600	117	
Town of Loomis	Placer	$4,060		4
*City of Corona	Riverside	$23,324		64

City	County	Grant Amount	Fully Functional **	Flash Only***
City of Indio	Riverside	$45,220	17	
City of Moreno Valley	Riverside	$49,000		20
*City of Rancho Mirage	Riverside	$23,879		32
City of Temecula	Riverside	$101,805	54	
*City of Temecula	Riverside	$6,457	7	
*City of Elk Grove	Sacramento	$10,800	9	
*City of Sacramento, Public Works	Sacramento	$11,040		18
*County of Sacramento	Sacramento	$101,859	89	
*City of Chino	San Bernardino	$4,200		4
*City of Fontana	San Bernardino	$86,400	72	
City of Highland	San Bernardino	$10,800	9	
*City of Rancho Cucamonga	San Bernardino	$113,550	34	75
City of Victorville	San Bernardino	$17,472	8	
*City of Victorville	San Bernardino	$1,872	2	
Town of Apple Valley	San Bernardino	$44,100		18
City of Chula Vista	San Diego	$281,960	106	
City of El Cajon	San Diego	$42,000	15	
*City of Encinitas	San Diego	$48,222	47	
City of Escondido	San Diego	$103,600		37
*City of Escondido	San Diego	$21,000		20
City of Imperial Beach	San Diego	$5,320	2	
City of La Mesa	San Diego	$124,320	55	
City of National City	San Diego	$12,250		5
*City of Poway	San Diego	$45,600	38	
*City of San Diego	San Diego	$73,386		104
*City of San Marcos	San Diego	$25,200	21	
City of San Marcos	San Diego	$86,800	31	
City of Santee	San Diego	$70,470		37
*City of Vista	San Diego	$17,548	15	
City of Vista	San Diego	$52,374	30	
*County of San Diego	San Diego	$134,400	112	
City and County of San Francisco	San Francisco	$254,800	91	
City of Rancho Santa Margarita	San Luis Obispo	$66,500	Declined Grant	
City of San Luis Obispo	San Luis Obispo	$25,200	10	
County of San Luis Obispo, Dept. Of Public Works	San Luis Obispo	$26,600	10	
City of Brisbane	San Mateo	$6,090	3	
*City of Lompoc	Santa Barbara	$15,600	13	

City	County	Grant Amount	Fully Functional **	Flash Only***
City of Santa Barbara	Santa Barbara	$204,820	Declined Grant	
City of Cupertino	Santa Clara	$37,352	23	
City of Gilroy	Santa Clara	$23,940	9	
*City of Milpitas	Santa Clara	$40,800	34	
City of Palo Alto	Santa Clara	$28,420	14	
City of Sunnyvale	Santa Clara	$271,600	97	
County of Santa Clara	Santa Clara	$287,140	103	
*City of Vacaville	Solano	$20,821		47
City of Sebastopol	Sonoma	$5,600	2	
City of Ceres	Stanislaus	$30,800	11	
*City of Ceres	Stanislaus	$6,000	5	
City of Live Oak	Sutter	$2,800	1	
City of Yuba City	Sutter	$47,040	25	
City of Dinuba	Tulare	$2,450		1
City of San Buenaventura	Ventura	$56,000	20	
City of Thousand Oaks	Ventura	$124,950		51
County of Ventura	Ventura	$33,320	13	
	******Grant Totals**	$7,240,292	2,435	1,143

* Existing battery backup systems

** Fully Functional means a battery backup system that is capable of operating all traffic signals (red, green, amber and pedestrian) during a power outage.

*** Flash Only means a battery backup system that only operates the red signals in flash mode during a power outage.

****The total depicted in these tables exceed first and second round totals of $10 million due to the first round grantees refusing funds prior to the deadline date of the second round funding.

Battery Backup System Second Round Solicitation Applicants

City	County	Grant Amount	Fully Functional**	Flash Only***
City of Alameda	Alameda	$64,400	23	
City of Newark	Alameda	$30,520	12	
City of Oakland	Alameda	$22,400	9	
City of Pittsburg	Contra Costa	$25,480	11	
County of El Dorado	El Dorado	$4,453	3	
City of Eureka	Humboldt	$70,000	25	
City of Arcadia	Los Angeles	$24,500		10
City of Beverly Hills	Los Angeles	$39,900	15	
City of Carson	Los Angeles	$305,200	109	
City of Claremont	Los Angeles	$8,400	3	
*City of Claremont	Los Angeles	$2,400	2	
City of Glendale	Los Angeles	$260,400	93	
City of Lancaster	Los Angeles	$73,500		30
City of Palmdale	Los Angeles	$17,150		7
City of Rancho Palos Verde	Los Angeles	$33,600	12	
City of Redondo Beach	Los Angeles	$42,000	15	
City of Torrance	Los Angeles	$82,880		37
City of West Hollywood	Los Angeles	$18,824		8
City of Whitter	Los Angeles	$148,820	28	26
City of Madera	Madera	$25,200	6	
City of Novato	Marin	$39,900	15	
*City of Atwater	Merced	$5,250		5
City of Merced	Merced	$28,000	10	
City of Monterey	Monterey	$28,000	10	
City of Pacific Grove	Monterey	$8,000	2	
City of Buena Park	Orange	$71,820	27	
City of Placentia	Orange	$15,680	7	
City of Seal Beach	Orange	$31,850		13
City of Tustin	Orange	$41,650		17
Town of Loomis	Placer	$4,060	2	
City of Cathedral City	Riverside	$25,200	9	
*City of Corona	Riverside	$3,280		9
City of Moreno Valley	Riverside	$58,800		24
City of Citrus Heights	Sacramento	$66,500	25	
*City of Citrus Heights	Sacramento	$15,761	14	
City of Elk Grove	Sacramento	$33,600	12	
City of Ontario	San Bernardino	$22,050		9
City of Rialto	San Bernardino	$103,530	38	
City of San Bernardino	San Bernardino	$66,500	25	
*City of Victorville	San Bernardino	$18,896	17	

City	County	Grant Amount	Fully Functional**	Flash Only***
City of Yucaipa	San Bernardino	$26,600	10	
Town of Yucca Valley	San Bernardino	$11,200	4	
*City of Lodi	San Joaquin	$21,733	20	
City of San Luis Obispo	San Luis Obispo	$15,120	6	
City of Brisbane	San Mateo	$ 4,060	2	
City of Menlo Park	San Mateo	$6,496	4	
City of Millbrae	San Mateo	$19,600	7	
City of San Bruno	San Mateo	$27,440	10	
City of San Carlos	San Mateo	$45,220	17	
City of San Mateo	San Mateo	$37,380	15	
*City of Lompoc	Santa Barbara	$8,400	7	
City of Santa Maria	Santa Barbara	$68,495	34	
City of Fremont	Santa Clara	$47,600	17	
City of Mountain View	Santa Clara	$156,940	59	
City of Sunnyvale	Santa Clara	$67,200	24	
City of Santa Cruz	Santa Cruz	$40,320	16	
City of Benicia	Solano	$19,600		8
*City of Fairfield	Solano	$23,711		55
City of Petaluma	Sonoma	$78,400	28	
City of Dinuba	Tulare	$4,760	2	
City of San Buenaventura	Ventura	$46,900	19	
City of Thousand Oaks	Ventura	$127,680	57	
	******Grand Totals**	$2,893,209	937	258

*Existing battery backup systems
**Fully Functional means a battery backup system that is capable of operating all traffic signals (red, green, amber and pedestrian) during a power outage.
***Flash Only means a battery backup system that only operates the red signals in flash mode during a power outage.
****The total depicted in these tables exceed first and second round totals of $10 million due to the first round grantees refusing funds prior to the deadline date of the second round funding.

APPENDIX D: LETTERS OF ACKNOWLEDGMENT

CITY OF SANTEE

March 2, 2004

Mr. David Rubens
California Energy Commission
1516 Ninth Street, MS-1
Sacramento, CA 95814-5512

SUBJECT: City of Santee Battery Back-up System Project - Grant Award #BBS-02K-090

Dear Mr. Rubens,

On the behalf of the City of Santee, we would like to thank the California Energy Commission for the opportunity to participate in the Battery Back-up System Grant program. At the time the grant application was submitted to the California Energy Commission, only two (2) of the forty-four (44) traffic signal controlled intersections had a battery back-up system installed. The grant provided for the installation of thirty-seven (37) battery back-up systems.

The City experienced a major power outage due to the Southern California wildfires this past October. All of the traffic signals that had a battery back-up system installed remained in operation for a period of over 14 hours. Having these traffic signals in operation alleviated any inconvenience to motorists and emergency vehicles during that state of emergency.

Since the completion of the grant project, the City of Santee has established a new policy of implementing a battery back-up system in all future traffic signal installations. If you have any questions or need additional information, please contact me at 619-258-4100, extension 189 or at my email address of dbarnes@ci.santee.ca.us.

Dennis D. Barnes

DENNIS D. BARNES, P.E.
City Traffic Engineer
DDB:ddb

S:\TRAFFIC\BBS Project\Thank_you_ltr_to_Energy_Commission.doc

10601 Magnolia Avenue • Santee, California 92071 • (619) 258-4100 • www.ci.santee.ca.us

CITY OF FAIRFIELD

Founded 1856 — Incorporated December 12, 1903

FAIRFIELD CORPORATION YARD
420 GREGORY STREET
FAIRFIELD, CA 94533

707.428.7407
FAX 707.428.7638

Home of
Travis Air Force Base

March 24, 2004

Dave Rubens
California Energy Commission
1516 Ninth St., MS 42
Sacramento, CA 95814

Dear Dave:

The Battery Back Up System's that were installed in the City of Fairfield traffic signal controller cabinets have and are working very well. When we have a power outage the signals automatically go to red flash mode. This makes traveling safer for the public. Especially when people do not heed the law and understand that when a signal is inoperative the intersection is to be treated as an all way STOP. The flashing signals get the attention of the drivers and can be seen a greater distance than temporary STOP signs. One of the other advantages is that during a power outage with the BBS it will keep the memory in the controller and most of the time the signal will resume to its normal operation, this reduces the need for after hour service calls. We are specifying BBS in all of our new signal installation.

Sincerely,

William H. Norvas Jr.
Public Works Manager
Street/Traffic Division

Apple Valley gets grant to install backup batteries on traffic signals

Town awarded $44,100 on project, will spend $104,670

By EMILY BERG
Special to the Daily Press

APPLE VALLEY — The Energizer Bunny would be proud.

Blackouts at Apple Valley traffic signals may soon be a thing of the past.

Town officials expect new backup batteries on traffic signals to reduce the risk of accidents during power outages.

The California Energy Commission awarded a grant to the town of Apple Valley to help pay for backup batteries for 22 LED or energy efficient traffic signals in the town.

"A potential hazard is created when power is lost to a traffic signal," said Patty Saady, the deputy town manager. "Whether the disruption is from a rolling blackout or any other cause, these battery backup systems will keep the traffic signal operational for over two hours."

"A potential hazard is created when power is lost to a traffic signal."

PATTY SAADY
Apple Valley deputy town manager

The town received notification that it was one of the 89 California entities the state awarded with $44,100 to install the batteries. The town will cover the rest of the $104,670 project, said town project manager Gina Whiteside.

The Apple Valley Public Works Department and Caltrans should have the backup systems installed and operating by Feb. 28, 2003, Whiteside said.

During a power outage, town personnel must manually turn the traffic signals to flashing mode. The battery system gives them more time to get to each signal and is helpful as the number of traffic signals in the town increases, Whiteside said.

"The battery backup increases the safety aspect," she said.

The city of Victorville has the backup system on about 20 of its intersections. It started the program when California began experiencing rolling blackouts, said Guy Patterson, Victorville Public Works director.

"So far, it's been a really safe program," Patterson said. "It's also saved a lot of staff time. It really allows us to be a little more at ease when we hear there is going to be a power outage and we don't know where it's going to hit till the last second."

Daily Press 8/26/02